B-1589

Operational Characteristics and Herd Health Management Practices Associated with Brucellosis Quarantined Cattle Herds, U.S., 1980-82

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Preface

This report analyzes herd health management practices and operational characteristics of the owners of newly quaran tined beef and dairy herds in the contiguous 48 states during 1980-82.

Data for this study were obtained via a nationwide questionnaire from Veterinary Medical Officers, Animal and Plan Health Inspection Service (APHIS), U.S. Department of Agriculture. Information was collected on herd health manage ment practices and characteristics of quarantined herds; methods of identifying infection; the origin of cattle in quaran tined herds; adjacent herd testing; relationship of vaccination level to reactor rate; reactors removed; length of quarantine and number of tests; disposition of quarantined herds; and associated epidemiological data. In addition to the regiona demarcation, which consisted of the South Central states, the Southeast, the Northeast, the North Central states, and the West, the data are also assembled by subgroups such as herdsize, cattle type, and vaccination status.

Funding for this study was provided by Veterinary Services, APHIS, U.S. Department of Agriculture, and the Texas Ag ricultural Experiment Station.

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Introduction

A recent economic and epidemiologic analysis of U.S. bovine brucellosis programs (Dietrich, Amosson, and Crawford 1985) required the acquisition of data concerning herd health management practices and associated epidemiological information of newly quarantined beef and dairy brucellosis herds in the contiguous 48 states during 1980-82. Detailed information was obtained from Veterinary Medical Officers, Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture, via a nationwide questionnaire of newly quarantined herds.

Information was collected on such factors as herd health management practices and characteristics of quarantined herds; methods of identifying infection; cattle sources in quarantined herds; adjacent herd testing; relationship of vaccination level to reactor rate; reactors removed; length of quarantine and number of tests; and disposition of quarantined herds.

The original purpose for the collection of this data was to update and/or develop epidemiologic coefficients for analyzing alternative U.S. bovine brucellosis programs. However, the data reveals considerable basic information and statistics relating to quarantined beef and dairy herds which are not available to the livestock industry, government agencies, and other personnel concerned with animal health. Therefore, these data were assembled and analyzed as presented in this report.

Regional Demarcation

Regional delineations for the purpose of assembling data from the national brucellosis questionnaire of newly quarantined herds was based on such factors as herd health management practices, geographic considerations, and incidence of disease, as shown in Figure 1. In addition to the regional demarcation, which consisted of the South Central states, the Southeast, the Northeast, the North Central states and the West, the data were also assembled by subgroups such as herdsize, cattle type, vaccination status, and disposition of quarantined herds. U.S. averages, when applicable, were obtained by weighing the regional coefficients developed from the questionnaires by the regional number and/or proportion of newly quarantined beef and dairy herds in the contiguous 48 states during 1982.

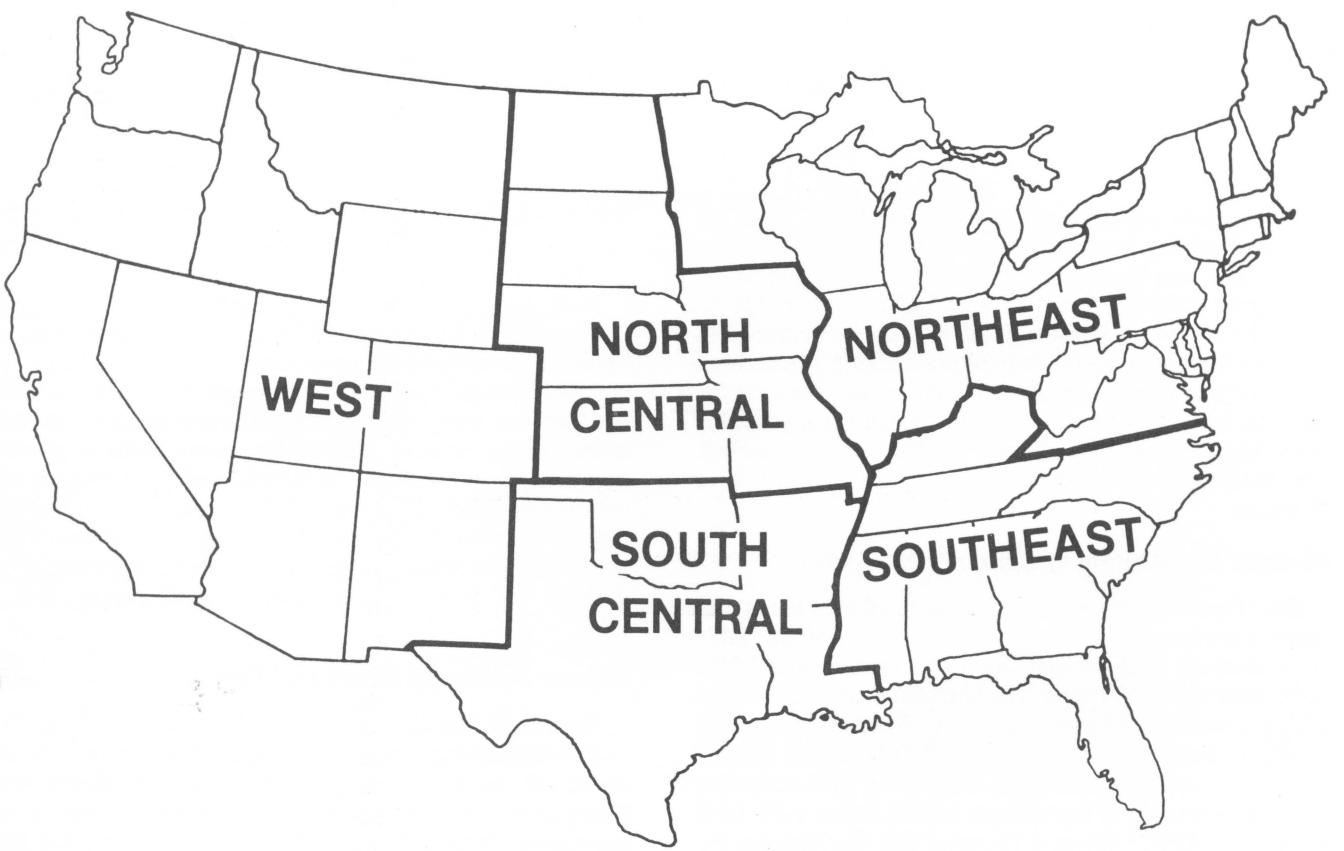

Figure 1. Regional delineation of herd health management—epidemiological survey of newly quarantined brucellosis herds, contiguous 48 states, 1980-82.

Completed Questionnaires

Completed and usable questionnaires numbered 1,455 and represented about 15 percent of newly quarantined herds in the contiguous 48 states for Fiscal Year (FY) 1981 as shown in Table 1. The two regions with the largest numbers of newly infected herds, the South Central and Southeast, were represented by the largest number of completed questionnaires, and, at the same time, by the lowest completion rate compared to the number of quarantined herds during FY 1981. These results were anticipated because of (1) large regional variations in the numbers of newly quarantined herds, (2) workload associated with completing the questionnaire with limited available resources, and (3) regional differences in personnel required for conducting the on-going state/federal programs in each region. All questionnaires were edited for completeness and questions were resolved by telephone or were returned by mail with instructions for completion.

Table 1. Number of completed questionnaires for newly quarantined beef and dairy herds, newly quarantined cattle herds FY 1981, and percent completion rate, by region, U.S., 1980-82.

Region	Completed and Usable Questionnaires			FY 1981 Newly Quarantined Herds	Questionnaire Completion Rate
	Beef	Dairy	Total		
	Number				Percent
Northeast	87	47	134	229	58.5
Southeast	526	69	595	3,709	16.0
North Central	276	26	302	735	41.1
South Central	353	4	357	4,946	7.2
West	50	17	67	188	35.6
U.S. Total	1,292	163	1,455	9,807	14.8

Characteristics of Quarantined Herds

Basic characteristics of quarantined herds such as herdsize, calving season, maximum grazing and calving density, and past history of infection, varied by region in the U.S. during 1980-82. Herdsize is an important variable because the number of tests required to clean up quarantined herds are generally related to herdsize. Calving season is an important variable in herd health management because the potential transmission of the *Brucella* organism is generally at the highest level immediately prior to and after parturition. References to the U.S. in this study are the contiguous 48 states.

Herdsize Distribution of Quarantined Herds

More than 90 percent of the quarantined beef herds consisted of herds with less than 99 head during 1980-82 (Table 2). Almost all of the remaining 10 percent included beef herds with 100 to 499 head. The beef and dairy herdsize distribution patterns of newly quarantined herds in Table 2 closely coincide with the herdsize distribution of quarantined beef and dairy herds in the U.S. during 1978 according to U.S. Department of Agriculture APHIS Forms 4-35. Data reported on APHIS Forms 4-35 reveal that the herdsize distribution of quarantined beef herds in the U.S. during 1978 was as follows: 1-99 head, 88.3 percent; 100-499 head, 9.7 percent; and 500 head or more, .5 percent. The herdsize distribution for quarantined dairy herds during 1978 was 1-99 head, 59.6 percent; 100-499 head, 31.1 percent; and 500 head or more, 9.3 percent.

More than 90 percent of the quarantined dairy herds were represented by herds with 199 head or less (Table 2). Among herdsize groups, herds consisting of 20 to 49 head accounted for higher percentages of quarantined herds in both the beef and dairy sectors than did other groups. Furthermore, comparisons of quarantines among herdsize groups reveal that beef herds of 1 to 19 head and 20 to 49 head accounted for almost 71 percent of the quarantined beef herds. Among dairy herds, the top 2 herdsize groups representing the largest percentage of quarantined herds were the 20 to 49 head and 50 to 99 head groups with 62 percent of the total.

Calving Season by Month and Region

More than two-fifths of the quarantined herds relied on year-round calving practices during 1980-82 (Table 3). Year-round calving was most prevalent in the Southeast and South Central states, whereas seasonal calving was more pronounced in the West, the North Central states, and the Northeast. For producers not using year-round calving practices, March and April were the most prominent calving months, followed by May and February (Table 3).

Table 2. Herdsize distribution of quarantined beef and dairy herds by region, U.S., 1980-82.

Herdsize (head)	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Beef:						
1-19	28.2	35.7	17.2	31.5	11.1	31.8
20-49	38.5	42.8	41.4	36.4	22.2	38.8
50-99	26.9	16.2	29.3	20.7	11.1	19.6
100-199	3.8	3.5	9.4	6.5	27.8	5.9
200-499	2.6	1.6	2.7	4.6	16.7	3.6
500-999	NR	NR	NR	.3	5.6	.2
1,000 or more	NR	.2	NR	NR	5.5	.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Dairy:						
1-19	NR	11.1	31.6	ID	13.1	12.2
20-49	33.3	34.9	36.8	ID	26.1	34.2
50-99	60.0	28.6	5.3	ID	13.0	28.1
100-199	6.7	19.0	26.3	ID	34.8	19.8
200-499	NR	4.8	NR	ID	8.7	4.1
500-999	NR	NR	NR	ID	4.3	.4
1,000 or more	NR	1.6	NR	ID	NR	1.2
Total	100.0	100.0	100.0	ID	100.0	100.0

NR = None reported.
ID = Insufficient data to report separately.

Table 3. Calving season of quarantined herds by month and region, U.S., 1980-82.

Month	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
January	3.3	5.2	2.4	6.4	2.7	5.6
February	8.2	5.8	6.2	8.6	11.4	7.5
March	17.7	9.8	22.3	12.0	23.5	12.1
April	16.5	7.8	22.6	9.2	19.5	9.8
May	11.9	6.2	14.0	5.8	14.1	6.7
June	4.9	1.2	4.9	1.4	2.7	1.6
July	2.1	.7	1.9	NR	2.0	.5
August	2.5	.9	1.2	NR	1.4	.5
September	2.9	3.1	2.1	.5	1.3	1.6
October	1.2	4.0	2.4	1.6	1.3	2.5
November	.8	4.8	2.5	2.8	1.3	3.4
December	.8	4.3	1.6	3.9	NR	3.8
Year-round	27.2	46.2	15.9	47.8	18.8	44.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

NR = None reported.

Grazing and Calving Density

Maximum grazing density varies by region and within region depending upon such factors as rainfall, geographic location, soil type, range and grass (forage) production, and grazing practices. The maximum grazing density for newly U.S. quarantined herds during 1980-82 averaged 6 acres per cow (Table 4). Producers in the Northeast reported the highest grazing density at almost 3 acres per cow in contrast to the West which reported about 30 acres per cow.

Maximum calving densities or acres per cow were slightly higher than maximum grazing densities in all regions except the West, where calving densities were about twice that of grazing densities. However, the pattern of maximum calving density in all regions was similar to the region's maximum grazing density.

Past History of Quarantines

More than 15 percent of the newly quarantined herds were previously quarantined and 14 percent cited the cause of the current infection as past quarantines (past infection) (Table 5). The South Central and Southeastern states reported the highest percentage of previous quarantines and also attributed the cause of the current infection more frequently to past quarantines than did other regions. The Northeast reported the highest proportion of herds not previously quarantined and also most often cited the cause of the current infection as newly introduced disease.

Table 4. Maximum grazing and calving density for quarantined herds by region, U.S., 1980-82.

Month	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Acres/Cow					
Maximum grazing density	2.9	3.4	4.2	7.3	29.4	6.0
Maximum calving density	2.7	3.3	3.5	7.0	12.9	5.4

Table 5. Percent of herds previously quarantined during last 5 years and cause of current disease, quarantined herds by region, U.S., 1980-82.

Herd Data	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Previously quarantined	2.2	14.7	11.4	16.8	11.6	15.4
Not previously quarantined	97.8	85.3	88.6	83.2	88.4	84.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Cause of current infection:						
Newly introduced disease	97.0	88.7	91.6	82.8	89.6	85.9
From past quarantine	3.0	11.3	8.4	17.2	10.4	14.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Origin of Cattle in Quarantined Herds

Fifty-four percent of the cattle in newly quarantined herds were introduced into the herd (purchased, leased, or borrowed) (Table 6). Regionally, quarantined herds in the South Central region and the West contained the highest proportion of introduced cattle, while herds in the Northeast contained the lowest percentage of introduced cattle.

The proportion of purchased (introduced) cattle in these newly quarantined herds was substantially higher than the U.S. beef-dairy cow and replacement heifer purchases during 1977-79, which were equivalent to 6.1 percent of the following January 1 inventory, according to Doane Agricultural Services. Earlier data, as reported in the *1969 Census of Agriculture, Volume V, Special Reports,* revealed beef and dairy cow purchases which were equivalent to 4.8 percent of the January 1, 1970, beef and dairy cow inventories.

These data suggest that owners of newly quarantined herds during 1980-82 were purchasing substantially higher proportions of beef and dairy test-eligible cattle than other buyers in the U.S. cattle industry. In addition, more than 40 percent of the newly quarantined herd owners during 1980-82 reported that 80 percent or more of the cattle in their herds were introduced into such herds. These data also suggest the importance of maintaining closed herds and/or isolation and pre-purchase and post-purchase testing of purchased cattle as a herd health management practice.

Origin of Purchased Cattle

More than one-third of the purchased cattle in quarantined herds were bought at public markets, while another 29 percent were purchased from other individuals (Table 7). Public markets and other individuals were of almost equal importance as a source of purchased cattle in the Southeast and North Central regions while public markets were most prominent in the South Central region. Other individuals were the most important source in the Northeast and West. Livestock dealers, the third most important source of purchased cattle, provided about 9 percent of the purchased cattle in quarantined herds. Approximately one-fourth of the purchased cattle were obtained from two or more market sources.

Table 6. Origin of cattle, quarantined herds by region, U.S., 1980-82.

	Region					
Source	Northeast	Southeast	North Central	South Central	West	U.S. Average
	Percent					
Introduced[1]	38.9	49.9	51.5	57.5	55.0	54.0
Born/raised in herd	61.1	50.1	48.5	42.5	45.0	46.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

[1] Purchased, leased, or borrowed.

Table 7. Source of purchased cattle, quarantined herds by region, U.S., 1980-82.

	Region					
Source of Purchase	Northeast	Southeast	North Central	South Central	West	U.S. Average
	Percent					
Other individuals	30.1	29.0	25.9	28.7	28.6	28.7
Livestock dealers	15.6	11.9	8.9	6.9	12.5	9.1
Public markets	14.5	31.7	29.2	36.7	16.1	33.7
Dispersal or consignment	4.9	3.3	2.9	3.4	3.6	3.4
Combination of above sources:						
Two combinations	29.1	18.6	25.9	18.1	26.7	19.1
Three combinations	5.8	4.2	4.1	4.5	9.0	4.4
All combinations	NR	.2	.3	.7	3.5	.5
Other	NR	1.1	2.8	1.0	NR	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

NR = None reported.

Frequency of Cattle Purchases

Fifty-three percent of the quarantined herd owners who introduced cattle into their herds purchased cattle two or more times a year, whereas 47 percent purchased cattle once a year (Table 8). Approximately 10 percent of the quarantined herd owners purchased cattle more than five times per year. The pattern relative to frequency of cattle purchases for quarantined herd owners was relatively stable on a regional basis with the West reporting the highest percentage of multiple purchases per year in contrast to the Northeast which revealed the lowest percentage of multiple purchases per year.

Type of Female Replacements Purchased

Type of female replacements purchased by owners of quarantined herds reveals some important herd health management practices (Table 9). Almost 40 percent of these owners purchased pregnant heifers; 30 percent purchased unbred heifers, either occasionally or more often; and more than 80 percent also purchased adult cows, either occasionally or more often.

Only 11 percent of the owners of quarantined herds who purchased cattle made it a general practice to buy strain 19 vaccinated cattle (Table 9). Most of the remaining 89 percent never purchased strain 19 vaccinated cattle.

Approximately 45 percent of the owners of quarantined herds purchasing cattle made it a general habit to obtain proof of *Brucella* test negative status when buying cattle. Two-thirds of the remaining 55 percent never required proof of *Brucella* test negative status for their purchased cattle.

Table 8. Frequency of cattle purchases during 1976-80, quarantined herds by region, U.S., 1980-82.

Frequency of Purchase	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
One time only	52.8	43.7	50.1	48.7	36.7	46.8
2-5 times/year	38.5	46.1	40.0	42.0	58.7	43.6
More than 5 times/year	8.7	10.2	9.9	9.3	4.6	9.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 9. Type of female replacements purchased during 1976-80 by producers of quarantined herds, U.S., 1980-82.

Item	Always	Generally	Occasionally	Never	Total
	Percent				
Unbred heifers	8.3	7.4	13.9	70.4	100.0
Pregnant heifers	6.5	9.1	24.0	60.4	100.0
Adult cows	37.8	24.5	19.7	18.0	100.0
Strain 19 vaccinated cattle	5.0	6.0	36.7	52.3	100.0
Proof of test negative status received	25.5	20.4	18.9	35.2	100.0

Identification and Source of Infection

Methods used for identifying infected herds, adjacent herd testing practices, and data to support the most probable source of *Brucella* varied by region. Factors cited as the probable source of *Brucella* were fairly consistent throughout all regions.

Method for Identifying Infected Herds

Testing at livestock markets was cited as the most frequent method for identifying infected herds in all regions except the Northeast, where brucellosis ring tests were cited most often in conjunction with the relatively large dairy population in that region (Table 10). Testing at livestock markets identified 48 percent of the newly quarantined herds during 1980-82. The second most important method for identifying infection was testing at diagnostic laboratories, followed by adjacent herd testing, testing at slaughter plants, private tests, and brucellosis ring testing.

Among regions, newly quarantined herds in the Northeast were identified most often through brucellosis ring tests, followed by testing at slaughter plants, livestock markets, and diagnostic laboratories (Table 10). Livestock markets were highly important in the Southeast, followed by adjacent herd testing, diagnostic laboratories, and brucellosis ring tests. The North Central region ranked livestock markets first, followed by diagnostic laboratories, slaughter plants, adjacent herd testing, and private tests. Livestock markets were cited as the predominant method for identifying newly quarantined herds in the South Central region, followed by diagnostic tests, slaughter plants, and adjacent herd testing. Livestock markets also ranked first for identifying infection in newly quarantined herds in the West, followed by slaughter plants, brucellosis ring tests, diagnostic tests, and private tests.

Adjacent Herd Testing

Research has revealed that testing of herds adjacent to newly quarantined herds is a highly effective tool in identifying additional infected herds, thereby reducing the prevalence of brucellosis infection and the costs associated with the disease (Amosson 1983). More than 52 percent of the herds adjacent to newly quarantined herds were tested (Table 11). The Northeast and West reported the highest proportion of adjacent herd testing followed closely by the Southeast. The lowest levels of adjacent herd testing occurred in the South Central region which also reported a substantially higher percentage of adjacent herds with reactors than did other regions. The average number of herds adjacent to quarantined herds ranged from 1.8 in the South Central region to 2.5 in the Northeast.

Nationally, about 38 percent of the herds adjacent to newly quarantined herds were found to be infected (Table 11). The South Central and Southeast regions revealed the highest percentage of adjacent herds with reactors, while the more sparsely populated West reported the lowest rate of adjacent herds with reactors.

Table 10. Method for identifying infected bovine brucellosis herds by region, U.S., 1980-82.

Method of Identification	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Slaughter plant	14.6	4.5	12.3	12.6	14.5	9.6
Livestock market	13.1	45.5	32.7	53.6	21.7	48.1
Brucellosis ring test	24.1	7.1	3.9	.8	13.0	3.9
Diagnostic (abortion, etc.)	12.4	8.9	16.2	13.7	11.6	12.0
Private test-sale or show	4.4	5.4	10.3	5.0	10.2	5.6
Herd recertification	2.9	.2	NR	.8	NR	.6
Area recertification	NR	1.0	NR	NR	NR	.4
Post-movement test	2.2	1.2	2.9	1.1	8.7	1.4
Area-community test	7.3	5.8	1.9	.8	5.8	2.9
Purchase from infected herd	7.3	1.5	3.2	1.1	NR	1.5
Adjacent-neighborhood herd	6.6	15.8	11.0	7.0	5.8	10.5
Common pasture test	.7	.3	.7	1.1	5.8	.8
Other	4.4	2.8	4.9	2.4	2.9	2.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

NR = None reported.

Table 11. Average number of herds adjacent to quarantined herds, percent of adjacent herds tested, and percent of adjacent herds with reactors by region, U.S., 1980-82.

Item	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Number					
Average number of adjacent herds	2.5	1.9	2.3	1.8	2.0	1.9
	Percent					
Adjacent herds tested	79.9	71.9	61.6	35.8	79.7	52.2
Adjacent herds with reactors	20.3	29.3	24.3	46.3	12.7	37.7

Probable Source of Brucella Infection

Fifty-five percent of producers with newly quarantined herds reported purchased cattle as the probable source of infection (Table 12). These statistics appear to lend credence to the often repeated phrase that "more infection is introduced into herds via trailers/trucks than any other means." Twenty-seven percent of the respondents reported that the second most cited probable source of infection was adjacent pastures.

Purchased cattle and adjacent pastures ranked first and second in all regions as the probable source of infection. "Other" sources, which were generally not identified, and "unknown" sources ranked a distant third or fourth in all regions. Environmental factors and borrowed cattle were cited in only a few instances as a probable source of infection.

Data to Support the Probable Source of Brucella

Three-fourths of the respondents did not indicate the availability of data to support the probable source of *Brucella* infection (Table 13). For example, almost 45 percent did not indicate the availability of any data or information to support the probable source of infection. Another 6 percent indicated that the probable source was unknown, and about 25 percent indicated "other," which consisted of various opinions about the probable source.

Less than 3 percent of the respondents revealed an isolation of the *Brucella* biotype (Table 13). Although 97 percent of the respondents reported no biotype isolation, more than 21 percent reported that either direct contact with the source was observed or community spread was postulated.

Table 12. Probable source of *Brucella* infection, quarantined herds by region, U.S., 1980-82.

Source of Infection	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Borrowed cattle	1.1	1.3	1.5	1.2	NR	1.2
Adjacent pasture	20.8	31.5	30.9	23.0	21.6	26.6
Environmental	3.1	3.0	1.5	1.8	1.7	2.3
Purchased cattle	55.2	48.1	50.7	60.1	63.3	55.0
Other	11.5	8.2	7.0	6.6	11.7	7.4
Unknown	8.3	7.9	8.4	7.3	1.7	7.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

NR = None reported.

Table 13. Data to support the probable source of *Brucella* for quarantined herds by region, U.S., 1980-82.

Item	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Biotype isolated:						
Biotype 1	2.9	2.5	2.6	1.4	27.5	2.3
Biotype 2	NR	NR	NR	NR	1.5	*
Biotype 4	1.5	.2	NR	NR	NR	.1
No isolation:						
Direct contact	3.6	7.1	8.1	8.1	11.6	7.7
Community spread	8.8	18.3	15.5	11.5	1.5	14.1
Other	16.1	25.4	26.5	25.1	24.6	25.2
Unknown	3.6	4.6	6.2	7.0	1.4	5.9
Not specified	63.5	41.9	41.1	46.9	31.9	44.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

NR = None reported.

* = Less than .005.

Relationship of Vaccination Level and Reactor Rate

Utilization of calfhood vaccination (CV) and herd vaccination level in newly quarantined herds during 1980-82 revealed substantial differences in initial and cumulative reactor rates.

Utilization of Calfhood Vaccination

Eighty-one percent of the owners of newly quarantined herds did not use calfhood vaccination (Table 14). Calfhood vaccinations comprised 12.4 percent of the cattle tested on the initial test among quarantined herds during 1980-82. This is substantially lower than the 30.2 percent and 20.1 percent calfhood vaccination rate reported by Veterinary Services, APHIS, U.S. Department of Agriculture, for U.S. cattle producers during 1980-82 and 1976-80, respectively. The lowest percentage of quarantined herd owners using calfhood vaccination occurred in the Southeast followed by the South Central and North Central states. More than 40 percent of the owners of newly quarantined herds in the West reported using calfhood vaccination in their herds.

Herd Vaccination Levels

More than 84 percent of the newly quarantined beef herds and 68 percent of the newly quarantined dairy herds did not contain vaccinates (Table 15). Among beef herds, the Southeast and South Central states contained the highest proportions of non-vaccinated beef herds. Among newly quarantined dairy herds, the Southeast also had substantially higher proportions of non-vaccinated herds than did other regions. Table 15 also reveals that quarantined dairy herds with 80 to 100 herd vaccination levels represented about 11 percent of the quarantined dairy herds compared to less than 2 percent of the quarantined beef herds.

Initial and Cumulative Beef Cattle Reactor Rate by Vaccination Status

Although calfhood vaccination does not provide 100 percent protection against brucellosis, initial tests of vaccinated and non-vaccinated cattle in newly quarantined beef herds revealed that initial reactor rates in vaccinated cattle were about two-fifths the rate for non-vaccinated cattle (Table 16). In addition, the cumulative reactor rate or total proportion of reactors removed from the herds was almost two and one-half times greater for non-vaccinated cattle than for vaccinated cattle. Although the proportion of reactors removed from the herd by vaccination status varied by region, the general pattern of reactors removed on the initial tests and on a cumulative basis, by vaccination status, was similar across all regions.

Initial and Cumulative Dairy Cattle Reactor Rate by Vaccination Status

The proportion of reactors removed on the initial test and on a cumulative testing basis also varied by vaccination status in dairy herds as in beef herds (Table 17). The proportion of vaccinated dairy cattle identified as reactors on the initial test was about two-fifths the rate for non-vaccinates, a rate differential for vaccinates versus non-vaccinates that is almost identical to quarantined beef herds. The cumulative rate for vaccinated dairy cattle was about one-fourth the rate for non-vaccinated cattle. The total proportion of reactors removed from the herd on the initial test and on a cumulative basis in both beef and dairy herds was heavily weighted by the reactor rate in non-vaccinated cattle because non-vaccinates comprised about 90 percent of the beef cattle tested on the initial test, compared to 54 percent of the dairy cattle.

Table 14. Percent of herd owners using calfhood vaccination (CV), quarantined herds by region, U.S., 1980-82.

Using Calfhood Vaccination	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Yes	27.2	13.3	24.4	21.3	40.3	18.9
No	72.8	86.7	75.6	78.7	59.7	81.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 15. Herd vaccination level, quarantined beef and dairy herds by region, U.S., 1980-82.

Percent of Herd Vaccinated	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Beef:						
No Vaccinates	78.2	91.7	71.5	81.8	56.8	84.3
1%-19%	10.3	3.7	17.6	12.7	9.1	9.7
20%-39%	5.1	1.4	4.7	1.9	6.8	2.0
40%-59%	1.3	1.4	2.3	1.8	11.4	1.8
60%-79%	1.3	.4	1.6	.3	4.5	.5
80%-100%	3.8	1.4	2.3	1.5	11.4	1.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Dairy:						
No Vaccinates	40.0	77.8	31.6	ID	45.5	68.4
1%-19%	40.0	9.5	15.8	ID	NR	12.8
20%-39%	NR	8.0	5.3	ID	9.1	7.1
40%-59%	NR	NR	10.5	ID	NR	1.1
80%-100%	20.0	4.7	36.8	ID	45.4	10.6
Total	100.0	100.0	100.0	ID	100.0	100.0

NR = None reported.
ID = Insufficient data to report separately.

Table 16. Initial and cumulative beef cattle reactor rates, quarantined herds by vaccination status and region, U.S., 1980-82.

Vaccination Status	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Vaccinated cattle:						
Initial	7.0	4.9	5.8	8.9	3.8	7.2
Cumulative	10.9	8.5	15.4	11.0	6.2	10.3
Non Vaccinated cattle:						
Initial	21.0	22.8	15.5	14.8	13.6	17.8
Cumulative	28.3	32.2	25.0	20.1	25.9	24.9
Total herd:						
Initial	19.6	21.4	15.0	14.3	10.3	16.9
Cumulative	26.6	31.6	24.4	19.9	15.8	24.4

Table 17. Initial and cumulative dairy cattle reactor rates, quarantined herds by vaccination status and region, U.S., 1980-82.

Vaccination Status	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Vaccinated cattle:						
Initial	4.8	.6	4.8	ID	.9	1.7
Cumulative	9.6	.6	5.5	ID	2.5	2.2
Non Vaccinated cattle:						
Initial	6.7	4.5	4.8	ID	1.5	4.3
Cumulative	23.0	9.3	11.7	ID	5.5	8.7
Total herd:						
Initial	5.7	3.2	4.8	ID	1.0	3.4
Cumulative	18.3	11.2	7.5	ID	2.9	8.8

ID = Insufficient data to report separately.

Initial and Cumulative Beef Herd Reactor Rate by Herd Vaccination Level and Region

The proportion of reactors removed from newly quarantined beef herds on the initial test and the total reactors removed on a cumulative testing basis decreased as the herd vaccination level increased (Table 18). For example, the initial reactor rate for non-vaccinated herds was 18 percent and decreased to a low of less than 4 percent for herds with a 60 percent to 79 percent herd vaccination level. The initial reactor rate then increased to 6 percent for herds with an 80 percent to 100 percent vaccination level.

The cumulative reactor rate similarly decreased from a high of 26 percent for non-vaccinated herds to a low of 6 percent for herds with a 60 percent to 79 percent herd vaccination level. These data suggest that both the initial and cumulative reactor rates tend to decline as herd vaccination levels increase.

The decline in initial and cumulative reactor rates as herd vaccination levels increased was more variable within regions than in the regional or U.S. average (Table 18). While the trend in initial and cumulative herd reactor rates tended to decline as herd vaccination levels increased in the Northeast, the Southeast, the North Central region and the West, this relationship was not as stable in the South Central region. For example, quarantined herds with 80 percent to 100 percent herd vaccination levels in the South Central region revealed higher levels of initial and cumulative infection rates than herds with lower herd vaccination levels. This suggests that other factors may also affect initial and cumulative reactor rates.

Table 18. Initial and cumulative beef herd reactor rates by herd vaccination level and region, U.S., 1980-82.

Percent of Herd Vaccinated	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
No Vaccinates:						
Initial	19.2	21.7	16.6	15.4	13.0	17.8
Cumulative	26.0	32.0	25.5	21.5	20.6	25.6
1%-19%:						
Initial	34.5	29.0	13.8	10.7	1.3	17.6
Cumulative	48.3	41.5	24.5	14.5	1.3	25.1
20%-39%:						
Initial	ID	20.5	11.3	10.5	11.9	14.2
Cumulative	ID	33.3	16.3	21.0	13.4	25.1
40%-59%:						
Initial	ID	13.2	9.4	5.6	6.9	8.6
Cumulative	ID	21.2	23.2	8.7	8.1	14.1
60%-79%:						
Initial	ID	3.4	4.0	ID	1.2	3.4
Cumulative	ID	3.4	21.2	ID	2.6	5.8
80%-100%:						
Initial	1.3	2.1	5.0	10.3	3.7	6.3
Cumulative	2.9	8.4	10.4	13.5	9.1	11.3

ID = Insufficient data to report separately.

Initial and Cumulative Beef and Dairy Herd Reactor Rate by Herd Vaccination Level

The initial and cumulative herd reactor rates for both newly quarantined beef and dairy herds decreased as herd vaccination levels increased (Table 19). However, the cumulative reactor rate for quarantined beef herds did not decrease until vaccination levels exceeded 40 percent. Comparison of initial and cumulative herd reactor rates between quarantined beef and dairy herds, by herd vaccination levels, reveals that initial herd reactor rates for dairy herds were generally about one-third those of beef herds. Cumulative herd infection rates for dairy herds, by herd vaccination levels, were about one-half to one-fifth the rate for beef herds, depending on vaccination levels (Table 19). The lower initial and cumulative reactor rates in dairy herds versus beef herds emphasizes the importance of early detection resulting from the more frequent or periodic testing of dairy herds as a result of brucellosis ring testing programs.

Table 19. Initial and cumulative beef and dairy herd reactor rates by herd vaccination level, U.S., 1980-82.

Percent of Herd Vaccinated	Beef		Dairy	
	Initial	Cumulative	Initial	Cumulative
	Percent			
No vaccinates	17.8	25.6	3.1	11.8
1%-19%	17.6	25.1	5.1	18.8
20%-39%	14.2	25.1	5.6	9.1
40%-59%	8.6	14.1	2.2	2.2
60%-79%	3.4	5.8	NR	NR
80%-100%	6.8	11.3	1.4	2.4

NR = None reported.

Length of Quarantine and Number of Tests

Data revealed that herdsize was positively related to length of quarantine and number of tests required for release from quarantine. Data obtained from the Texas Animal Health Commission for 6,200 herds released from quarantine during 1981-84 showed that herds with a history of a high proportion of replacements during quarantine tended to remain on quarantine longer than herds with either no replacements or a low proportion of replacements. Preliminary results from the Texas Animal Health Commission data also reveal that initial herd reactor rate had little or no effect on number of tests or length of quarantine.

Length of Quarantine and Number of Tests for Quarantined Herds

Newly quarantined beef herds were under quarantine for an average of 199 days compared to 216 days for dairy herds prior to release from quarantine and/or depopulation (Table 20). Further, quarantined beef herds underwent 3.6 tests prior to release from quarantine and/or depopulation, compared to almost 5 tests per herd for dairy herds.

Table 20 also reveals that beef herds tended to remain in quarantine longer and undergo more tests in the West and South Central regions than any other region. Dairy herds, in contrast, remained under quarantine for longer periods and underwent more tests in the Northeast and West prior to release from quarantine and/or depopulation.

Average quarantine length for beef herds in the U.S. increased 20 percent when adjusted for depopulated herds (Table 21). Non-depopulated beef herds or quarantined herds which continued testing until the quarantine was released were under quarantine for 239 days and underwent an average of 4.2 tests per herd. Depopulated beef herds, in

Table 20. Average length of quarantine and average number of tests for quarantined beef and dairy herds by region, U.S., 1980-82.

Item	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
Beef:						
Average length of quarantine (Days)	134.9	164.1	183.0	220.8	209.3	199.1
Average number of tests	2.7	3.4	2.9	3.8	4.3	3.6
Dairy:						
Average length of quarantine (Days)	257.9	184.8	181.9	194.0	245.7	215.8
Average number of tests	6.7	5.0	4.0	3.0	7.1	4.7

Table 21. Length of quarantine and number of tests by method of quarantine disposition of quarantined beef and dairy herds, U.S., 1980-82.

Disposition of Herd Quarantine	Beef		Dairy	
	Quarantine Length	Number of Tests	Quarantine Length	Number of Tests
	Days	Number	Days	Number
Depopulated	120.2	2.3	166.8	4.1
Reactors removed	239.2	4.2	198.8	4.2
Under quarantine[1]	330.3	5.8	364.5	7.7
Total	199.1	3.6	215.8	4.7

[1]Still under quarantine when the survey was completed.

contrast, reported quarantine periods of 120 days, or about one-half of the quarantine period for beef herds that continued testing until all reactors were removed. Number of tests for depopulated beef herds averaged 2.3 tests per herd.

Newly quarantined dairy herds that continued testing until all reactors were removed remained under quarantine for longer periods and underwent more tests than depopulated herds. However, differences in quarantine length and number of tests between depopulated and non-depopulated dairy herds released from quarantine were substantially less in quarantined dairy herds than in quarantined beef herds (Table 21).

Length of Quarantine and Number of Tests by Herd Vaccination Level

Length of quarantine for newly quarantined beef and dairy herds tended to be longer for vaccinated herds than for non-vaccinated herds (Table 22). The number of tests did not appear to be affected by herd vaccination level in either the beef or dairy sectors.

Relationship of Herdsize to Length of Quarantine and Number of Tests

Herdsize had a positive effect on the number of tests and length of quarantine for both quarantined beef and dairy herds (Table 23). For example, length of quarantine for beef herds increased more than 70 percent as the herdsize group increased from 1-19 head to 200-499 head. The number of tests for beef herds increased 40 percent as the herdsize group increased from 1-19 head to 200-499 head (Table 23). Quarantined dairy herds depicted a similar herdsize pattern between quarantine length and number of tests.

Data obtained from the Texas Animal Health Commission for more than 6,200 beef herds and approximately 200 dairy herds released from quarantine during 1981-84, obtained similar results (Table 24). This information also demonstrated the positive herdsize relationship between length of quarantine and number of tests depicted by newly quarantined U.S. beef and dairy herds. Both the number of tests and the length of quarantine for the Texas beef herds released from quarantine more than doubled as the herdsize increased from 1-19 head to 200-499 head. Dairy herds released from quarantine in Texas revealed a mixed relationship between number of tests and length of quarantine in relation to herdsize (Table 24). A possible contributing factor to this relationship for Texas dairy herds is that more than 57 percent of the Texas dairy herd producers continued adding replacements to their herds while they were under quarantine.

Table 22. Average length of quarantine and average number of tests by herd vaccination level of quarantined beef and dairy herds, U.S., 1980-82.

Percent of Herd Vaccinated	Beef		Dairy	
	Quarantine Length	Number of Tests	Quarantine Length	Number of Tests
	Days	Number	Days	Number
No vaccinates	193.7	3.5	182.3	5.2
1%-19%	202.0	3.9	240.0	5.9
20%-39%	224.1	4.5	215.7	5.2
40%-59%	230.8	4.5	237.0	4.0
60%-79%	239.5	4.1	NR	NR
80%-100%	244.0	3.9	221.9	4.8

NR = None reported.

Table 23. Average length of quarantine and average number of tests for quarantined beef and dairy herds by herd size, U.S., 1980-82.

Herdsize (Head)	Beef		Dairy	
	Quarantine Length	Number of Tests	Quarantine Length	Number of Tests
	Days	Number	Days	Number
1-19	163.5	3.0	160.2	3.4
20-49	192.4	3.7	173.6	4.3
50-99	236.3	4.1	227.5	6.0
100-199	249.5	3.8	255.7	6.4
200-499	281.3	4.2	ID	ID
500-999	ID	ID	ID	ID
1,000 or more	ID	ID	ID	ID

ID = Insufficient data.

Table 24. Relationship of herdsize to number of tests and days under quarantine per quarantined beef and dairy herd, Texas, 1981-84.

Herdsize (Head)	Beef		Dairy	
	Quarantine Length	Number of Tests	Quarantine Length	Number of Tests
	Days	Number	Days	Number
1-19	215.9	3.8	297.5	8.7
20-49	282.2	4.7	364.5	7.3
50-99	346.1	5.8	287.2	6.1
100-199	407.9	6.4	363.6	9.2
200-499	440.1	7.7	354.9	8.6
500 or more	690.3	9.5	698.0	8.0
State average	285.0	4.8	336.5	8.0

Disposition of Quarantined Herds and Selected Characteristics of Depopulated Herds

The disposition of newly quarantined herds during 1980-82 varied by cattle type, region, vaccination level, reactor rate, and herdsize.

Disposition of Quarantined Herds by Region

Thirty-seven percent of the beef herds quarantined during 1980-82 were depopulated, compared to 11 percent of the dairy herds (Table 25). Approximately two-thirds of the quarantined beef herds in the Northeast and North Central regions were depopulated, as were almost 57 percent of the quarantined herds in the Southeast. The South Central region depopulated the lowest proportion of quarantined beef herds, followed by the West. The Northeast also depopulated the highest proportion of quarantined dairy herds, followed by the Southeast and North Central regions.

Disposition of Quarantined Beef Herds by Herd Vaccination Level

More than 39 percent of the non-vaccinated, newly quarantined beef herds were depopulated, compared to a depopulation rate of almost one-third for vaccinated beef herds (Table 26). Depopulation rates tended to decrease slightly as herd vaccination levels increased.

Non-vaccinated beef herds, which represented 84 percent of the total newly quarantined beef herds, accounted for 88 percent of the depopulated beef herds and 82 percent of the herds released from quarantine (Table 27). Regionally, non-vaccinates comprised a higher proportion of the depopulated beef herds in the Southeast than any other region (Table 27). Furthermore, non-vaccinates, plus herds with less than 20 percent herd vaccination levels, accounted for 92 percent or more of the depopulated beef herds in all regions except the West. Vaccinated beef herds, at the same time, represented a higher proportion of the depopulated beef herds in the West than in any other region. This is not unexpected since the West reported higher proportions of beef herds using calfhood vaccination than did other regions. The West was also the only region which reported that vaccinated beef herds represented more than 50 percent of the beef herds released from quarantine (Table 27). Vaccinated beef herds in the Southeast, in contrast, represented about 12 percent of beef herds released from quarantine.

Table 25. Disposition of quarantined beef and dairy herds by region, U.S., 1980-82.

Disposition	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Beef:						
Quarantine released	30.8	38.8	35.1	75.0	52.3	58.7
Depopulated	67.9	56.9	64.1	20.4	40.9	37.0
Still quarantined	1.3	4.3	.8	4.6	6.8	4.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Dairy:						
Quarantine released	73.3	65.1	89.5	100.0	63.6	77.0
Depopulated	26.7	14.3	10.5	NR	9.1	10.7
Still quarantined	NR	20.6	NR	NR	27.3	12.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

NR = None reported.

Table 26. Disposition of quarantined beef herds by herd vaccination level, U.S., 1980-82.

Percent of Herd Vaccinated	Herd Depopulated	Quarantine Released	Still Quarantined	Total
	Percent			
No vaccinates	38.6	57.0	4.4	100.0
1%-19%	35.3	60.6	4.1	100.0
20%-39%	16.4	76.2	7.4	100.0
40%-59%	6.6	93.4	NR	100.0
60%-79%	17.8	82.2	NR	100.0
80%-100%	30.8	69.2	NR	100.0

NR = None reported.

Table 27. Herd vaccination level for depopulated beef herds and beef herds released from quarantine by region, U.S., 1980-82.

Percent of Herd Vaccinated	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Depopulated:						
No vaccinates	81.1	93.8	76.2	83.3	72.2	88.1
1%-19%	13.2	4.5	15.9	15.2	NR	9.1
20%-39%	1.9	.7	3.1	NR	5.6	.9
40%-59%	1.9	NR	1.8	NR	5.6	.3
60%-79%	1.9	NR	1.2	NR	5.5	.2
80%-100%	NR	1.0	1.8	1.5	11.1	1.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Quarantine Released:						
No vaccinates	70.8	87.8	63.4	81.9	43.5	82.1
1%-19%	4.2	3.1	20.0	11.5	17.4	9.8
20%-39%	12.5	2.5	7.8	2.1	4.4	2.5
40%-59%	NR	3.6	3.3	2.5	17.4	3.0
60%-79%	NR	1.0	2.2	.4	4.3	.7
80%-100%	12.5	2.0	3.3	1.6	13.0	1.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

NR = None reported.

Table 28. Disposition of quarantined dairy herds by herd vaccination level, U.S., 1980-82.

Percent of Herd Vaccinated	Herd Depopulated	Quarantine Released	Still Quarantined	Total
	Percent			
No vaccinates	11.2	73.6	15.2	100.0
1%-19%	20.4	73.8	5.8	100.0
20%-39%	10.6	66.0	23.4	100.0
40%-59%	NR	100.0	NR	100.0
60%-79%	NR	NR	NR	NR
80%-100%	3.7	91.1	5.2	100.0

NR = None reported.

Disposition of Quarantined Dairy Herds by Herd Vaccination Level

The proportion of dairy herds vaccinated had little or no effect on the disposition of newly quarantined dairy herds during 1980-82 because approximately the same proportion of non-vaccinated dairy herds as vaccinated dairy herds were depopulated (Table 28). In addition, Table 29 reveals about 63 percent of the total depopulated dairy herds were non-vaccinated herds, whereas 58 percent of the newly quarantined dairy herds consisted of non-vaccinates during 1980-82. However, a comparison of Tables 15 and 28 suggests that as herd vaccination levels increased, the proportion of depopulated dairy herds tended to decrease. This conclusion is further substantiated by Table 29, which reveals that 25 percent of the depopulated dairy herds consisted of herds with herd vaccination levels of 19 percent or less, whereas the proportion of newly quarantined herds with less than 20 percent herd vaccination levels comprised less than 13 percent of the total quarantined dairy herds.

Table 29. Herd vaccination level for depopluated dairy herds and dairy herds released from quarantine, U.S., 1980-82.

Percent of Herd Vaccinated	Depopulated Herd	Herd Released From Quarantine
	Percent	
No vaccinates	62.5	57.7
1%-19%	25.0	12.8
20%-39%	6.3	5.1
40%-59%	NR	3.9
60%-79%	NR	NR
80%-100%	6.2	20.5
Total	100.0	100.0

NR = None reported.

Initial and Total Herd Reactor Rate of Depopulated Herds and Herds Released from Quarantine

Both the initial and cumulative reactor rates for depopulated beef herds were about twice as high as the initial and cumulative rates for beef herds released from quarantine (Table 30). Initial and cumulative reactor rates were from 6 to 9 times higher for depopulated dairy herds as were initial and cumulative rates for dairy herds released from quarantine. The average cumulative reactor rate for depopulated beef herds was 33 percent compared to 32 percent for depopulated dairy herds (Table 30). The cumulative reactor rate for beef herds released from quarantine averaged 16 percent, while dairy herds averaged 3 percent.

A comparison of regional cumulative reactor rates for depopulated beef and dairy herds reveals that the highest reactor rates were generally reported in the Northeast, the Southeast, and the North Central regions (Table 30). Cumulative reactor rates for beef herds released from quarantine were highest in the Southeast and the South Central regions, while the Northeast and North Central regions reported the highest cumulative rates for dairy herds released from quarantine.

Disposition of Quarantined Beef Herds by Herdsize

Decisions regarding depopulation of newly quarantined beef herds during 1980-82 were not based on herdsize because the proportion of herds depopulated and/or released from quarantine was distributed evenly throughout all herdsizes (Table 31). In addition, depopulated beef herds averaged almost 53 head per herd, compared to an average size of 52 head per quarantined beef herd on the initial test. However, more than 90 percent of the beef herds depopulated and also released from quarantine consisted of herds with less than 100 head (Table 32). Furthermore, quarantined herds ranging from 20-49 head per herd comprised the largest proportion of herds depopulated and also released from quarantine in all regions except the West, where herds ranging in size from 100 to 199 head predominated.

The herdsize distribution patterns of Table 32 generally coincide with the quarantined beef herdsize distribution patterns in Table 2. However, industry herdsize distribution patterns reported by the 1978 Census of Agriculture revealed higher proportions of herds with 1-19 head and lower proportions of herds with 20-49 and 50-99 head than are shown in Tables 2 and 32. This was not unexpected, because variations exist in herd health management practices within and between herdsize groups and regions. In addition, larger herdsize groups generally contain more purchased cattle than smaller herdsize groups.

Depopulation data were obtained on 16 dairy herds. Depopulated dairy herds averaged 39 head per herd, whereas newly quarantined dairy herds during 1980-82 averaged 112 head on the initial test. These data suggest that of the dairy herds depopulated, the predominant majority were smaller herds.

Table 30. Initial and cumulative herd reactor rate by region for depopulated beef and dairy herds and herds released from quarantine, U.S., 1980-82.

Item	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Depopulated:						
Beef:						
Initial	26.0	27.0	19.5	21.5	14.6	24.3
Cumulative	35.6	36.6	31.7	26.9	20.1	32.9
Dairy:						
Initial	13.5	18.0	8.6	NR	4.8	15.9
Cumulative	45.4	26.0	68.6	NR	4.8	31.6
Quarantine released:						
Beef:						
Initial	6.4	12.2	5.5	11.6	6.0	11.4
Cumulative	7.8	19.1	8.0	15.9	12.3	16.3
Dairy:						
Initial	2.8	1.5	4.7	3.3	1.0	2.5
Cumulative	8.4	2.5	5.5	3.3	1.4	3.4

NR = None reported.

Table 31. Disposition of quarantined beef herds by herdsize, U.S., 1980-82.

Herdsize (Head)	Herd Depopulated	Quarantine Released	Still Quarantined	Total
	Percent			
1-19	40.4	57.5	2.1	100.0
20-49	36.6	60.1	3.3	100.0
50-99	32.2	61.1	6.7	100.0
100-199	39.8	52.6	7.6	100.0
200-499	27.2	57.0	15.8	100.0
500-999	87.0	13.0	NR	100.0
1,000 or more	100.0	NR	NR	100.0

NR = None reported.

Table 32. Herdsize distribution of depopulated beef herds and beef herds released from quarantine by region, U.S., 1980-82.

Herdsize (head)	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Depopulated:						
1-19	30.2	38.2	17.1	36.4	11.1	34.9
20-49	35.8	41.7	40.2	33.3	22.2	38.6
50-99	28.3	14.9	26.2	16.7	11.1	16.9
100-199	3.8	3.8	12.8	7.6	27.8	6.2
200-499	1.9	1.0	3.7	4.5	16.7	2.6
500-999	NR	NR	NR	1.5	5.6	.5
1,000 or more	NR	.4	NR	NR	5.5	.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Quarantine released:						
1-19	25.0	34.0	17.8	31.3	13.0	31.2
20-49	41.6	44.7	44.5	38.3	26.1	39.9
50-99	25.0	17.3	33.3	20.6	13.0	20.2
100-199	4.2	2.5	3.3	5.7	34.8	5.2
200-499	4.2	1.5	1.1	4.1	8.7	3.4
500-999	NR	NR	NR	NR	4.4	.1
1,000 or more	NR	NR	NR	NR	NR	NR
Total	100.0	100.0	100.0	100.0	100.0	100.0

NR = None reported.

Selected Statistics Per Depopulated Herd and Disposition of Calves in Quarantined Herds

The number of total cattle and breeding cattle sold for slaughter per depopulated herd generally varied on a regional basis in relation to the herdsize structure within each region. Owners of depopulated herds averaged selling almost 50 head per herd for slaughter, with breeding cattle accounting for about 40 head per herd or almost 80 percent of the total cattle sold for slaughter (Table 33). Producers of depopulated herds also averaged selling about seven calves per herd for slaughter. The remaining cattle sold for slaughter from depopulated herds, about 5 percent of the total, were test eligible cattle that were not classified as breeding cattle or calves.

A comparison of depopulated herdsize groups on a regional basis shows that the largest depopulated herds were in the West, while the Southeast reported the fewest number of cattle per depopulated herd (Table 33). The South Central and North Central regions reported the smallest number of calves sold per depopulated herd.

Disposition of Heifer Calves During 1977-80

An analysis of the disposition of heifer calves during 1977-80 by herds which were quarantined during 1980-82 reveals that more than 41 percent of the heifer calves were retained in such herds (Table 34). The U.S. Department of Agriculture reported a retention rate of 45 percent during 1977-80, suggesting that pre-quarantine retention rates were similar to those of average U.S. cattle producers. Table 34 also reveals that more than 86 percent of the heifer calves sold during 1977-80 were 6 months old or older.

Quarantined herds in the West reported the highest heifer retention rates, followed by the Southeast. Lowest heifer retention rates were reported by the North Central and South Central regions.

Table 33. Number of cattle, breeding cattle, and calves sold for slaughter per depopulated herd by region, U.S., 1980-82.

Item	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Number/Depopulated Herd					
Cattle sold for slaughter	55.8	37.3	51.4	44.2	169.7	48.6
Breeding cattle sold for slaughter	38.1	29.1	46.5	39.7	134.2	39.8
Calves sold for slaughter	16.6	8.3	3.6	2.1	11.1	7.3

Table 34. Disposition of heifer calves during 1977-80, quarantined herds by region, U.S., 1980-82.

Disposition	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Retained in herd	41.1	45.6	25.6	29.3	70.3	41.1
Sold at age:						
Less than 6 months old	8.2	11.9	4.0	10.4	2.3	8.0
6 to 12 months old	32.3	35.4	53.4	55.1	23.7	41.8
More than 12 months old	18.4	7.1	17.0	5.2	3.7	9.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Disposition of Vaccinated Heifer Calves During 1977-80

More than two-thirds of the heifer calves vaccinated during 1977-80 were retained by quarantined herd owners (Table 35). Another 5 percent were sold to other producers for herd additions with the remainder, about 27 percent, sold for non-breeding purposes.

Quarantined herds in the West and Southeast reported the highest retention rate for vaccinated heifers during 1977-80, followed by the South Central and Northeast. The lowest vaccinated heifer retention rate was reported by the North Central region with less than 40 percent.

Table 35. Dispositon of vaccinated heifer calves during 1977-80, quarantined herds by region, U.S., 1980-82.

Disposition of Vaccinates	Region					U.S. Average
	Northeast	Southeast	North Central	South Central	West	
	Percent					
Retained in herd	61.2	70.4	39.2	61.2	88.6	68.0
Sold for breeding	6.8	2.3	7.1	3.7	8.1	5.3
Sold for other purposes	32.0	27.3	53.7	35.1	3.3	26.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Summary

This report presents information and data concerning operational characteristics, herd health management practices, and related epidemiological information regarding newly quarantined beef and dairy brucellosis herds in the contiguous 48 states during 1980-82.

Detailed information was obtained through Veterinary Medical Officers, APHIS, U.S. Department of Agriculture, via a nationwide questionnaire on herd health management practices and characteristics of quarantined herds; methods of identifying infection; source of cattle in quarantined herds; adjacent herd testing; relationship of vaccination level to reactor rate; reactors removed; length of quarantine and number of tests; and disposition of quarantined herds. The following information provides selected findings of this report.

Characteristics of Quarantined Herds

- More than 90 percent of the newly quarantined beef herds consisted of herds with less than 100 head.
- More than 94 percent of the quarantined dairy herds were represented by herds with 199 or fewer head.
- Herds ranging from 20 to 49 head accounted for higher percentages of quarantined herds in both the beef and dairy sectors than any other group. The group with the second highest proportion of quarantined herdsize in the beef sector were herds with 1-19 head, compared to dairy herds with 50-99 head.
- More than 44 percent of the quarantined herds relied on year-round calving practices.
- Approximately 15 percent of the newly quarantined herds were previously quarantined.

Origin of Cattle in Quarantined Herds

- Fifty-four percent of the cattle in newly quarantined herds were introduced into the herd via purchases and/or leasing and borrowing arrangements. This was substantially higher than for the U.S. beef-dairy industry during 1977-79.
- Public markets were the source for 34 percent of the cattle purchased, followed by other individuals with 29 percent, livestock dealers with 9 percent, and dispersal or consignment sales with 3 percent. Various combinations of these sources accounted for the remaining 25 percent.
- Fifty-three percent of the quarantined herd owners who introduced cattle into their herds purchased cattle two or more times per year.
- Almost 40 percent of the quarantined herd owners purchased pregnant heifers, 30 percent purchased unbred heifers, either occasionally or more often, and more than 80 percent purchased adult cows, either occasionally or more often.
- Eleven percent of the quarantined herd owners who purchased cattle made it a general practice to buy strain 19 vaccinated cattle.

Identification and Source of Infection

- The most prevalent method of identifying newly infected herds was through testing at livestock markets, where 48 percent of the newly quarantined herds were identified. The next most important method included diagnostic laboratories, followed by adjacent herd testing, testing at slaughter plants, private tests, and brucellosis ring testing.

- More than 52 percent of the herds adjacent to newly quarantined herds were tested, with 38 percent of these herds found to be infected.
- Purchased cattle were cited by 55 percent of the quarantined herd owners as the probable source of infection. Adjacent herds were cited by 27 percent as the probable source of infection.

Relationship of Vaccination Level and Reactor Rate

- Eighty-one percent of the newly quarantined herds did not use calfhood vaccination.
- Approximately 84 percent of the newly quarantined beef herds and 68 percent of the newly quarantined dairy herds did not contain vaccinates.
- Reactor rates on initial tests in vaccinated beef and dairy cattle were about two-fifths the rate of non-vaccinated cattle.
- The cumulative reactor rate for quarantined beef herds did not decrease until vaccination levels exceeded 40 percent. However, total cumulative beef reactor rates were about two and one-half times greater for non-vaccinated cattle compared to vaccinated cattle.
- The cumulative reactor rate for vaccinated dairy cattle was about one-fourth the rate for non-vaccinated cattle.
- The initial and cumulative herd reactor rates for beef and dairy herds decreased as herd vaccination levels increased.

Length of Quarantine and Number of Tests

- Beef herds were under quarantine for an average of 199 days compared to 216 days for dairy herds.
- Owners of beef and dairy herds, who continued testing until all reactors were removed, averaged 4.2 tests per herd.
- Length of quarantine for both beef and dairy herds tended to be longer for vaccinated herds than for non-vaccinated herds.
- Herdsize had a positive effect on the number of tests and length of quarantine for both beef and dairy herds.

Disposition of Quarantined Herds and Selected Characteristics of Depopulated Herds

- Thirty-seven percent of the beef herds were depopulated compared to 11 percent of the dairy herds.
- Higher proportions of non-vaccinated beef herds were depopulated than vaccinated herds. Among dairy herds, vaccination status had little or no effect on depopulation.
- Both initial and cumulative reactor rates for depopulated beef herds were about twice as high as initial and cumulative rates for beef herds released from quarantine.
- Initial and cumulative reactor rates were from 6 to 9 times higher for depopulated dairy herds as were initial and cumulative rates for dairy herds released from quarantine.

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